

2009 South Dakota State University Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

The South Dakota State University (SDSU) College of Agriculture and Biological Sciences (ABS) is comprised of the South Dakota Agricultural Experiment Station (AES), South Dakota Cooperative Extension Service (CES), and AgBio Academic Programs (AP). The SDSU College of Family and Consumer Sciences (FCS) is actively involved in programs conducted with AES and CES. This institution serves South Dakota and the Northern Great Plains, and through cooperative arrangements conducts programs that impact the nation and world.

This integrated Plan of Work is a statement of South Dakota's intended activities for the next five years, amended in 2007 to include FY 2012, as required by the Agriculture Research, Extension, and Education Reform Act of 1998 (AREERA). This plan incorporates national areas of emphasis established by the Cooperative State Research, Education and Extension Service (CSREES) of the U.S. Department of Agriculture with the integrated AES and CES Planned Programs at South Dakota State University. This plan will change as external factors evolve and stakeholder input identifies new needs and opportunities.

SDSU strives for a high degree of integration and cooperation among scientists, specialists and educators. This Plan of Work reflects an overview of eight planned programs. Implementation of each program will reflect a greater degree of integration than can be reflected in this brief summary. This Plan of Work reflects substantial stakeholder input from all segments of South Dakota.

The population of South Dakota is ranked 46th in the nation, with an estimated 775,933 people (2005 Census Estimate). One-third of the population is found in the two largest counties, and 44 percent of the population is found in the five most populated counties. The largest counties also have the most active growth in population, income and economic development. Minnehaha County alone has 20 percent of the state's population. Lincoln County is ranked as the fifth fastest growing county in the nation. The remaining 60 counties have lower levels of population growth, and pervasive levels of poverty. Poverty is particularly high on the Native American reservations in the state.

Historically, between 12 and 16 percent of South Dakota's population ranks below the poverty level, and in 2003 the number was estimated to be 12.3 percent. Fourteen percent of South Dakota children live in poverty. The U.S. Department of Agriculture's Economic Research Service reports that in 2003, the average annual income in South Dakota was \$28,856. Statewide unemployment is consistently in the three to four percent range, and was at 3.5 percent in 2004. This indicates that most citizens are employed, but do not have high paying jobs. One result is that most families have two wage earners, in some cases each wage earner holds more than one job. A total of 60,000 people in South Dakota do not have health insurance; the largest percentage is in the 18-35 age group.

These factors set the stage for out-migration from South Dakota to other places that are perceived to have job opportunities with higher income. Recently, this out-migration has slowed, and reversed in the 30-40 year old category as they return to South Dakota. Quality of family life issues are listed as key reasons for these people to return to their home state.

South Dakota has five Native American reservations. The Native American population represents approximately eight percent of the total state population. Three of the counties with reservations have been listed among the ten poorest counties in the United States. Five of the ten poorest counties in the nation are in South Dakota, meaning that poverty is not just a problem in reservation counties. Unemployment, alcoholism, poor diet, drug addiction, obesity, diabetes and other health and social problems are prevalent in reservation areas with high poverty rates.

South Dakota State University has developed working agreements with the four 1994 Land Grant Institutions located in South Dakota, and is continuing to offer programs that address these social and economic needs.

Agriculture is the largest sector of the state's economy, generating a total impact of \$16.8 billion in 2002. Seventy-four percent of all farms have gross earnings of less than \$100,000 per year, while 24% earn between \$100,000 and \$499,999 each year. Two percent earned \$500,000 or more. This indicates there are two types of agriculture being conducted in South Dakota: large-scale and small-scale agriculture. Currently, there are 31,600 farms with an average size of 1,386 acres.

The Northern Great Plains was known as the Great American Desert during the 19th Century. Numerous types of abiotic, biotic and social stresses continue to be a part of living in the Northern Great Plains. A major emphasis of SDSU research and Extension programs is aimed at assisting citizens in dealing with the various forms of stress that are a part of living here. To highlight this commitment to stress-related research and education, the ABS College adopted the Biostress philosophy during the early 1990's.

The South Dakota Agricultural Experiment Station has research facilities at eight primary locations within the state. Most of the scientists are located at the main campus in Brookings, but they conduct research throughout the state. Scientists, and Extension specialists, are also located at the SDSU West River Ag Center at Rapid City. The WestRiverCenter serves as the primary host for integrated CES and AES programs west of the Missouri River. Research project leaders are also located at the Dakota Lakes Research Farm near Pierre, in central South Dakota, and at the Southeast South Dakota Research Farm near Beresford. Both of these research farms also feature strong Extension educational components. Both farms focus on farming systems research, with no-till technology and irrigation being emphasized at DakotaLakes and diversification of corn/soybean rotations and livestock feeding being emphasized at the Southeast Farm.

There are four research farms that are continuously staffed with support personnel. The AES scientists from Brookings and Rapid City conduct research at these stations; however, project leaders are not permanently located there. Crop production research is conducted at the Northeast Research Station near Watertown and at the Central Crops and Soils Research Station near Highmore. Neither of these stations are irrigated. Beef, sheep, and range research is conducted at the Antelope Station near Buffalo in NorthwesternSD and at the Cottonwood Station in the West-Central part of the state. AES and CES staff work cooperatively to offer educational field days at each station.

There are also several locations where AES research is conducted on cooperating stakeholder property. These cooperative arrangements greatly augment our research capabilities and provide direct linkages with many of our rural stakeholders.

In addition to research conducted by AES scientists, the Cooperative Extension Service is also doing on-farm research across South Dakota. This takes the form of demonstration projects, interpretation of AES research, and helping to transfer information from the scientist to the agricultural user. Each year, more than 40,000 Extension field demonstration plots across South Dakota provide farmers with direct access to applied research data specific to their local conditions.

The Cooperative Extension Service has offices located in 63 South Dakota counties and two Native American Reservations. An individual Memorandum of Agreement with each county documents the relationships, and establishes County Extension Advisory Boards. At the Field Education Unit level, county representatives of these boards provide input on programming efforts. The combined presence of Agricultural Experiment Station Research Farms and County Extension Offices across the state means that the South Dakota State University College of Agriculture and Biological Sciences is uniquely able to deliver educational services and meet the needs of the people of South Dakota.

SDSU affirms its civil rights obligations for service to minorities and underserved populations. Relying on needs assessment tools, SDSU will: 1) ensure that educational benefits are provided to a diverse audience of the state on a non-discriminatory basis; 2) document the organization's intent to maintain compliance with equal opportunity non-discrimination rules and regulations; 3) state the organizational commitment to value diversity within its staff, volunteers and citizens; 4) describe how the organization will secure and utilize citizen input through lay committees and collaborative boards on program priorities and needs assessments. Lay committees will be diverse and reflect the diversity of communities being served; 5) include written policy and procedures for informing the public of the university and Extension's responsibility for implementing the requirements of equal opportunity.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2009	168.0	0.0	193.0	0.0
2010	164.0	0.0	191.0	0.0
2011	160.0	0.0	187.0	0.0
2012	160.0	0.0	187.0	0.0
2013	160.0	0.0	187.0	0.0

II. Merit Review Process**1. The Merit Review Process that will be Employed during the 5-Year POW Cycle**

- Internal University Panel
- External Non-University Panel
- Expert Peer Review

2. Brief Explanation

All AES research projects are subjected to peer and merit review prior to implementation. All Hatch and multi-state projects require independent peer reviews from two scientists that are knowledgeable in the respective subject area. The department head or a departmental executive committee identifies peer reviewers. The department head and the AES Director serve as merit reviewers.

A standard review instrument facilitates peer and merit reviews. Reviewers are required to comment on why the proposed research is needed, it's relevance to agriculture, the target audience, and how it compliments other research.

Proposals for research grants that are funded by stakeholder groups are subjected to review by the stakeholders themselves and by college administrators. Much like the CRIS system, stakeholder groups ask for annual progress reports on funded research.

Cooperative Extension Service administrators will serve as the merit review team for the respective components of the plan of work. Department heads, specialists and educators will conduct peer reviews of programs.

III. Evaluation of Multis & Joint Activities**1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?**

The Planned Programs are based on input from traditional and non-traditional stakeholder groups who identified critical issues. For the purposes of program planning, South Dakota also considers the input of internal stakeholders, which includes Extension specialists and educators, and scientists. The resulting eight Planned Programs address critical needs and opportunities through integrated research and educational programs. This planning process results in regional Hatch-funded research projects: regional efforts to assess winter injury in new alfalfa varieties (MN, SD, WI); the multi-state exchange and testing of elite experimental lines or new varieties of wheat, oats, soybeans and other crops; regional air quality and manure management initiatives; sharing of common curricula – i.e. ServSafe; and common Extension program partnerships including poverty reduction and youth citizenship.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Great efforts are made to seek out and include under-served and under-represented populations in the initial planning of research

and Extension programs. In some cases, this involves direct contact with under-served and/or under-represented audiences. In other cases, mass media announcements are used to invite all South Dakotans to participate in program planning. Two examples of how this early involvement has changed Planned Programs are: 1) the development of Spanish language translations of animal science publications for migrant workers at dairy farms; and 2) specific agreements between South Dakota State University and the 1994 institutions in South Dakota to provide educational and cultural exchanges, program delivery, and other opportunities.

3. How will the planned programs describe the expected outcomes and impacts?

The Planned Programs address specific outcomes that occur over the 6-year period of this plan. Some Planned Programs may deliver initial outcomes and impacts in the first year, but the overall impact of these programs will be felt beyond the 6-year planning cycle. Each of the eight South Dakota Planned Programs list specific outcomes that document progress.

4. How will the planned programs result in improved program effectiveness and/or efficiency?

South Dakota State University has a strong history of actively integrating research, teaching and Extension programs to deliver science-based information to all citizens. Stakeholder input, from Cooperative Extension Service five-year assessment planning data and other sources, is also used by scientists and classroom educators to gain a better understanding of current needs. Joint FTE appointments give individuals the opportunity to work in a combination of research, Extension and teaching functions, allowing the further integration and transfer of information within the system.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder groups
- Survey specifically with non-traditional individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to traditional stakeholder groups
- Survey of traditional stakeholder groups
- Survey specifically with non-traditional groups

Brief explanation.

South Dakota State University solicits formal stakeholder input in many forms, from many sources, and at many locations. Methods of inviting stakeholder input include meetings or other communication with: Agricultural Experiment Station Research Farm Advisory Boards; Research Review Meetings with agricultural check-off groups including the South Dakota Soybean Research and Promotion Council, South Dakota Corn Utilization Council, South Dakota Beef Industry Council, South Dakota Oilseeds Council, South Dakota Pork Producers Council, South Dakota Wheat Commission, and others.

Input is also sought from state agricultural commodity groups including Ag Unity, the South Dakota Pork Alliance, the South Dakota Stockgrowers/Cattlemen, and the South Dakota Veterinary Medical Association.

Input is sought from funding organizations such as the National Institutes of Health, U.S. Department of Energy, National Science Foundation, NASA, Environmental Protection Agency, and the National Centers for Disease Control and Prevention. In addition, stakeholder input is solicited from governmental agencies, including: the Office of the Governor, the South Dakota Department of Agriculture, South Dakota Department of Environment and Natural Resources, South Dakota Game, Fish and Parks, South Dakota Department of Education and Cultural Affairs, Office of the State Veterinarian, Social Services, Job Service, National Agricultural Statistics Service, 1994 Institutions, and others.

Stakeholder input is sought at SDSU field day tours; SDSU agricultural meetings; Community Leader Meetings throughout the state; meetings with the South Dakota Board of Regents, South Dakota Legislature, and other elected officials and boards; and events open to the public such as the South Dakota State Fair and DakotaFest.

Additional input is solicited during comprehensive CSREES Departmental and Institutional Reviews, which span teaching, research and Extension activities.

Stakeholder input specifically for projects involving McIntire-Stennis funds is sought from the South Dakota Nurseryman's Association, the South Dakota Parks and Recreation Association, the South Dakota Department of Game, Fish and Parks, the U.S. Forest Service, and also from special project-oriented groups like the Mortensen Group. This group works specifically on the Mortensen Ranch project, and includes NRCS, local RC&D groups, and other local entities.

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Surveys
- Use Advisory Committees
- Needs Assessments
- Open Listening Sessions

Brief explanation.

Under the last Plan of Work, South Dakota established 13 Field Education Units representing all parts of South Dakota. Each unit is comprised of 1 to 9 counties. Stakeholders from each Field Education Unit across the entire state are identified, giving care to include any group or audience that may be or previously have been underrepresented or underserved. Invitations are issued to representatives from each of the identified stakeholder groups to participate in the program review and development planning session. A series of general news releases are issued inviting all citizens to participate in the process, even though they may not have been directly contacted.

Under our integrated system, there are four types of advisory boards, including:

Field Education Unit Advisory Boards – Required by South Dakota law, these advisory boards provide citizen input, guidance and direction at the county level for programming that targets priority needs and issues. Membership on this board is required by state statute to represent the racial population mix of the county and of the various interest groups served by Extension.

State Extension Advisory Board – This board provides guidance and input regarding statewide educational programs. The State Extension Advisory Board provides guidance and direction to the Cooperative Extension Service, and informally to the Agricultural Experiment Station. Members of this board are elected from each County Extension Advisory Board, and the 1994 land grant institutions.

Unit-Specific Advisory Boards – these include: Agricultural Experiment Station advisory groups for each research farm, departmental advisory boards such as the Animal Disease Research and Diagnostic Laboratory Advisory Board, and others.

Campus Resource Council – this board identifies SDSU resources available to the Cooperative Extension Service, coordinates program delivery and provides efficient access to educational expertise and opportunities. Members are appointed jointly by the SDSU Vice President of Academic Affairs, Director of the Cooperative Extension Service, and Dean of the College of Agriculture and Biological Sciences. It includes representatives from SDSU academic colleges and other campus units.

On-going Stakeholder Input is often sought during special planning meetings. For example, the Sun Grant Initiative planning meetings in August 2002 and November 2004 sought valuable feedback from groups representing energy development, community development, regional land grant scientists and Extension leaders, and other issue-oriented stakeholders.

The South Dakota State University conducts a series of Community Leader Meetings each year. The meetings are hosted by County Extension Offices, who invite county commissioners, state legislators, and other elected leaders to interact with SDSU administrators. These dialog sessions are important opportunities for a candid, two-way discussion of needs, programs, and future plans with local and state elected leaders.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with the general public (open meeting advertised to all)
- Survey specifically with non-traditional groups
- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups

Brief explanation

{NO DATA ENTERED}

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Research Programs
- Redirect Extension Programs
- To Set Priorities
- In the Budget Process

Brief explanation.

Administrators evaluate all input, requests and comments from stakeholders to determine if patterns of need exist, and if resources can be directed to the client requests. CES educators, specialists, and AES scientists actively seek out input to insure that research and education programs are fine-tuned to the current needs of stakeholders.

V. Planned Program Table of Content

S. NO.	PROGRAM NAME
1	Natural Resources and Environment
2	Plants and Their Systems
3	Animals and Their Systems
4	Agricultural, Natural Resource and Biological Engineering
5	Food and Non-food Products, Development, Processing, Quality and Delivery
6	Economics and Market Policy
7	Human Nutrition, Food Safety, and Human Health and Well-Being
8	Families, Youth and Communities

V(A). Planned Program (Summary)

Program #1

1. Name of the Planned Program

Natural Resources and Environment

2. Brief summary about Planned Program

The planned program will conduct research and provide Extension information on conservation and management of wildlife and fisheries resources. It will primarily assist landowners with wildlife and fisheries improvement. While a portion of this program will be of interest to rural landowners, the major areas of public interest is expected to be from urban audiences who want to incorporate wildlife opportunities in their backyard landscaping. Subsequently, there is a logical connection to SDSU soil and horticulture programs.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	11%		11%	
102	Soil, Plant, Water, Nutrient Relationships	40%		40%	
104	Protect Soil from Harmful Effects of Natural Elements	4%		4%	
111	Conservation and Efficient Use of Water	4%		4%	
112	Watershed Protection and Management	4%		4%	
121	Management of Range Resources	11%		11%	
123	Management and Sustainability of Forest Resources	4%		4%	
132	Weather and Climate	4%		4%	
133	Pollution Prevention and Mitigation	7%		7%	
135	Aquatic and Terrestrial Wildlife	11%		11%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

South Dakota currently ranks in the top five states in the nation in the number of licensed hunters and anglers. Fifty-eight percent of South Dakotans age 16 years and older participate in wildlife and fish related recreation. South Dakota has an excellent resource base, which is of significant economic importance to the state, and represents a major contributor to our overall quality of life. This planned program places emphasis on conducting research and providing public information on how to best maintain the state's wildlife and fisheries resource base.

2. Scope of the Program

- In-State Research
- Multistate Extension
- Multistate Research

V(D). Planned Program (Assumptions and Goals)**1. Assumptions made for the Program**

Wildlife and fisheries issues have long been associated with rural landowners. However, a growing urban audience is becoming interested in this topic. An example of rural interest could be a landowner exploring how to increase pheasant populations. An urban example would be how to landscape to attract specific songbirds.

2. Ultimate goal(s) of this Program

- Maintain the current focus of the SDSU Department of Wildlife and Fisheries Sciences to address related issues.
- Conduct research on South Dakota issues to add to understanding and improve the conservation and management of wildlife and fisheries resources.
- Protection of habitat in South Dakota, which is the state's natural resource base.

V(E). Planned Program (Inputs)**1. Estimated Number of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2009	0.0	0.0	40.5	0.0
2010	0.0	0.0	40.1	0.0
2011	0.0	0.0	39.3	0.0
2012	0.0	0.0	39.3	0.0
2013	0.0	0.0	39.0	0.0

V(F). Planned Program (Activity)**1. Activity for the Program**

The SDSU Department of Wildlife and Fisheries Sciences has an established and respected research program, and offers a service component that is responsive to South Dakota issues. While no formal Extension funds are provided, the continuum of research and service offers information that starts at the identified need for research, extends through the exploration and development of new knowledge, followed by the transfer of information to stakeholders who expressed need and interest.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Group Discussion ● One-on-One Intervention ● Education Class ● Workshop 	<ul style="list-style-type: none"> ● Web sites ● Newsletters

3. Description of targeted audience

- Land managers
- Wildlife and fisheries managers
- State citizens
- Urban stakeholders

V(G). Planned Program (Outputs)**1. Standard output measures****Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	200	2000	0	0
2010	200	2000	0	0
2011	200	2000	0	0
2012	200	2000	0	0
2013	200	2000	0	0

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications****2009 :0****2010 :0****2011 :0****2012 :0****2013 :0****3. Expected Peer Review Publications**

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs**1. Output Target**

- Research projects in Wildlife, Fisheries Sciences and areas related to the Planned Program

2009 :50**2010 :50****2011 :50****2012 :50****2013 :0**

V(I). State Defined Outcome

O. No	Outcome Name
1	Build on current research focus of Wildlife and Fisheries Science Department to address stakeholder issues
2	Conduct research on South Dakota issues to add to understanding and improving wildlife and fisheries resources
3	Consultations with land and resource managers in support of the overall protection of habitat in South Dakota.

Outcome #1**1. Outcome Target**

Build on current research focus of Wildlife and Fisheries Science Department to address stakeholder issues

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :20****2010 : 20****2011 : 20****2012 :20****2013 : 20****3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 135 - Aquatic and Terrestrial Wildlife

Outcome #2**1. Outcome Target**

Conduct research on South Dakota issues to add to understanding and improving wildlife and fisheries resources

2. Outcome Type : Change in Action Outcome Measure**2009 :50****2010 : 50****2011 : 50****2012 :50****2013 : 50****3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation

- 135 - Aquatic and Terrestrial Wildlife

Outcome #3

1. Outcome Target

Consultations with land and resource managers in support of the overall protection of habitat in South Dakota.

2. Outcome Type : Change in Knowledge Outcome Measure

2009 :20

2010 : 20

2011 : 20

2012 :20

2013 : 20

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 135 - Aquatic and Terrestrial Wildlife

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Competing Public priorities
- Competing Programatic Challenges
- Public Policy changes
- Government Regulations
- Other (high fuel prices)
- Appropriations changes
- Natural Disasters (drought,weather extremes,etc.)
- Economy

Description

Natural disasters and diseases, including avian influenza, CWD and others may have immediate and far-reaching implications for public priorities regarding research and extension programs. Changes in public policy with regard to wildlife and/or natural resource management.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Case Study
- After Only (post program)
- Before-After (before and after program)

Description

Research projects will be peer reviewed, and published in appropriate scientific journals and lay publications. Research information will also be provided in oral presentations at a variety of meetings.

Extension programs are in planning stages. Evaluation of these programs has not yet been determined.

2. Data Collection Methods

- Observation
- Sampling
- Case Study
- On-Site

Description

Each research project will identify appropriate data collection methods.

V(A). Planned Program (Summary)

Program #2

1. Name of the Planned Program

Plants and Their Systems

2. Brief summary about Planned Program

The goal of the AES research and CES educational programs on plants and their systems is to promote the culture of food, feed, fiber, and renewable fuel production systems that are profitable for the farmer, friendly to the environment and society, and is sustainable for the future. Research and extension programs are delivering new crop varieties for farmers that are superior in field performance, are tolerant or resistant to new disease races or crop insects, and have unique crop traits that are sought by the crop processing industry. Research and Extension programs are also working to bring the benefits of global positioning science and information management to production agriculture; offering the promise of increased efficiency, increased accuracy of targeted chemical and fertilizer applications, leading to increased yields. Currently, personnel are evaluating the potential for utilizing more water-use-efficient crops and new crop management practices in order to sustain a viable crop enterprise under moisture limiting conditions. Likewise, forage personnel are evaluating new forages and better management practices that sustain long-lived for stands and that improve feed quality. Soil programs promote conservation, soil fertility, and comprehensive nutrient management practices that are efficient and friendly to the environment and compatible with neighbors. Pest workers are promoting the proper identification, use of economic thresholds, and diagnosis of pest problems. These methods will increase profits and enhance the environment by reducing chemical inputs to control insects, diseases and weeds. The hiring of two seed scientists will enable breeding, plant pest, and biotechnology workers to collaborate and deliver new technology to farms via crop seed.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	14%		14%	
202	Plant Genetic Resources	17%		17%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	21%		21%	
204	Plant Product Quality and Utility (Preharvest)	3%		3%	
205	Plant Management Systems	17%		17%	
211	Insects, Mites, and Other Arthropods Affecting Plants	6%		6%	
212	Pathogens and Nematodes Affecting Plants	10%		10%	
213	Weeds Affecting Plants	6%		6%	
215	Biological Control of Pests Affecting Plants	3%		3%	
216	Integrated Pest Management Systems	3%		3%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Agronomy is at the forefront of the greatest state of transition faced by our society since the move from horse power to the internal combustion engine. The transition is occurring in three areas: 1) movement into biotechnology; 2) movement into information management; and, 3) transition of agriculture as a producer of feed, food and fiber, to feed, food, fiber, and energy. Resources for production agronomics must greatly increase to meet the new demands for food and energy. Annually, crop producers must cope with abiotic and biological factors that impact crop production in this state. South Dakota farmers are very vocal in demanding that research and extension resources be used to solve their production problems. Delivery of programs to meet these needs are of the highest priority in this program.

2. Scope of the Program

- Multistate Research
- In-State Extension
- Multistate Extension
- Integrated Research and Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Abiotic and/or biological factors will significantly impact crop production every year. Crop production program needs will vary year to year. Funding will remain relatively constant but the highest priority needs will likely receive the most funding. We assume that policy makers will respond to the new energy from agriculture paradigm, and will respond with increased resources. Farming goals and practices will evolve to meet new challenges from increased energy costs, as well as from new opportunities for higher profits.

2. Ultimate goal(s) of this Program

To meet the challenges of the new energy from agriculture paradigm shift.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2009	28.6	0.0	48.3	0.0
2010	27.9	0.0	47.8	0.0
2011	27.2	0.0	46.8	0.0
2012	27.0	0.0	46.0	0.0
2013	27.0	0.0	46.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Plant breeders, entomologists, and plant pathologists will develop superior varieties with tolerance or resistance to insects and new disease races. Agronomists will evaluate crop management systems and forage systems that are best adapted to South Dakota, including areas with a history of limited growing season moisture. Soil scientists will develop more effective and cost efficient strategies for conserving soils and reducing fertilizer inputs in cropping systems. Entomologists, plant pathologists, and weed scientists will develop more effective and cost efficient means to safely control plant pests while reducing chemical inputs; including IPM and alternative methods. Extension will deliver the resulting research and extension program impacts to the SD Department of Agriculture, SD Crop Improvement Association, SD Corn Utilization Council, SD Soybean Research & Promotion Council, SD Wheat Commission, SD Oilseeds Council, SD Association of County Weed & Pest Boards, SD Weed Commission, and Master Gardeners Association.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Other 2 (County Extension research) ● Other 1 (On-farm research plots) ● Demonstrations ● Education Class 	<ul style="list-style-type: none"> ● Other 1 (Radio) ● Web sites ● TV Media Programs ● Newsletters

● Workshop	
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3. Description of targeted audience

All farm producers, agricultural land owners, hobby gardeners, homeowners, and Master Gardeners

V(G). Planned Program (Outputs)**1. Standard output measures****Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	22870	20430	411	411
2010	23812	21587	428	427
2011	24693	22198	461	482
2012	25100	22350	490	510
2013	25000	22000	450	500

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications****2009 :0****2010 :0****2011 :0****2012 :0****2013 :0****3. Expected Peer Review Publications**

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs**1. Output Target**

- Number of research projects completed in SDSU Planned Program Two - Plants and Their Systems

2009 :10**2010 :10****2011 :10****2012 :10****2013 :0**

- Number of Plant Variety Protection (PVP) varieties - Title V registration

2009 :1**2010 :1****2011 :1****2012 :1****2013 :0**

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of farmers learning about new crops, varieties, crop management techniques, forages and biofuels.
2	Number of farmers learning new insect control and IPM management techniques
3	Number of farmers learning new plant disease control and IPM management techniques.
4	Number of farmers learning new chemical, biological, alternative weed control and IPM techniques and pesticide safety.

Outcome #1**1. Outcome Target**

Number of farmers learning about new crops, varieties, crop management techniques, forages and biofuels.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**3550**2010 :** 3900**2011 :** 4040**2012 :**4100**2013 :** 4000**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems

Outcome #2**1. Outcome Target**

Number of farmers learning new insect control and IPM management techniques

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**3630**2010 :** 3993**2011 :** 4392**2012 :**4480**2013 :** 4400**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems

Outcome #3**1. Outcome Target**

Number of farmers learning new plant disease control and IPM management techniques.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**2200**2010 :** 2300**2011 :** 2400**2012 :**2500**2013 :** 2000**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

Outcome #4**1. Outcome Target**

Number of farmers learning new chemical, biological, alternative weed control and IPM techniques and pesticide safety.

2. Outcome Type : Change in Knowledge Outcome Measure

2009 :2250

2010 : 3375

2011 : 3450

2012 :3560

2013 : 3400

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems

V(J). Planned Program (External Factors)**1. External Factors which may affect Outcomes**

- Natural Disasters (drought,weather extremes,etc.)
- Government Regulations
- Public Policy changes
- Competing Programatic Challenges
- Competing Public priorities
- Economy
- Other (changes in plant pests)
- Appropriations changes

Description

Drought, early or late frosts, storm damage to crops, and changes in plant pests will all have immediate impact on annual cropping patterns and practices. These elements are beyond the control of farmers and ultimately place a greater emphasis on management practices to overcome pests and natural disasters.

V(K). Planned Program (Evaluation Studies and Data Collection)**1. Evaluation Studies Planned**

- Before-After (before and after program)
- Other (Increase in biofuel production)

Description

Evaluation will also include:

- General:

- Pre and post-program surveys

- Grower testimonials

- Increase in gallons of biofuels produced in South Dakota, and resulting economic

- impact on

state and nation.

- Crops:

- Crop variety surveys from the SD Agricultural Reporting Service when available

- Entomology & IPM:

- Increased acres managed using new insect control strategies

- Changes in corn acreage devoted to ethanol and managed with new technologies

- Plant Pathology & IPM:

- Increase in number of registered First Detectors

- Number of samples sent to plant diagnostic laboratory

- Soils:

Number of soil samples submitted to soil testing laboratory
Frequency of soil sampling any given field
Measure frequency of nutrient deficiency symptoms
Document nitrate concentration in rural water and frequency of algae bloom in lakes
Document number of producers using manure that soil test to determine fertilizer rates

Weeds & IPM:

Herbicide survey
County surveys of noxious weed acres
Number of bio-control agents released, number of farmers using bio-control &am

2. Data Collection Methods

- Unstructured
- Tests
- Journals
- Sampling
- Structured
- Observation

Description

Each project will identify appropriate data collection methods.

V(A). Planned Program (Summary)**Program #3****1. Name of the Planned Program**

Animals and Their Systems

2. Brief summary about Planned Program

AES research and CES educational programs in the Departments of Animal and Range Sciences, Dairy Science and Veterinary Science focus on an integrated approach to sustainable and responsible utilization of our animal and range resources, promotion and advancement of the local dairy industry, and the transfer information and provide educational opportunities to veterinarians, producers, county educators, and other interested individuals regarding animal health. In Animal and Range Sciences, main areas of emphasis include utilization of locally produced commodities like DDGS and field peas, reduction of nutrient excretion by livestock, enhanced reproductive efficiency, management of range resources in extreme weather conditions, adding value through new technologies in Meat Science, and improving production efficiencies. Animal and Range Sciences efforts in feedlot and meats research have been critical to the development of the South Dakota Certified Beef program. Also, Animal and Range Sciences cooperative work in the area of nutrient and odor management has aided responsible growth of the livestock industry in South Dakota. Finally, Animal and Range Scientists work with producers in adapting the new technologies in a manner that is both profitable and environmentally sound. In Veterinary Science, animal health programs covers the following categories, primarily in food animals, but in other species as well when they are involved in disease pathogenesis or zoonoses: infectious disease, nutritional disease, genetic disease, toxicosis, disease management, disease prevention, and surveillance. In Dairy Science, goals will be accomplished through science-based research that positively impacts the people, economy, and natural resources of South Dakota and the region, especially those in the dairy and animal industries. Extension activities help people in South Dakota and surrounding areas improve their lives through an educational process that uses science-based knowledge focused on issues and needs. The Dairy Production program focuses on dairy cattle nutrition and seeks to develop best management practices that assists dairy producers in improving profitability. Examples include the use of distillers grains in dairy rations and training employees in proper milking techniques. The Dairy Manufacturing program focuses on the development of technologies for the dairy products manufacture, taking into consideration the dietary needs, together with current and future industry demands. Many of these projects are conducted under the auspices of the MN-SD Dairy Foods Research center. Both programs work closely with stake holders to identify contemporary needs of the industry and to help ensure that the needs of the rapidly growing dairy industry of the region are met. SDSU has initiated the publication of animal production publications in Spanish in an effort to deliver educational information to a growing number of livestock workers. This effort targets a previously underserved audience.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	18%		18%	
302	Nutrient Utilization in Animals	21%		21%	
303	Genetic Improvement of Animals	3%		3%	
305	Animal Physiological Processes	7%		7%	
307	Animal Management Systems	3%		3%	
308	Improved Animal Products (Before Harvest)	7%		7%	
311	Animal Diseases	38%		38%	
313	Internal Parasites in Animals	3%		3%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Livestock production is the single largest contributor to agricultural cash receipts in South Dakota, and a large portion of South Dakota is rangeland. Weather, markets, public perception, and a variety of other factors create challenges for the largest industry in South Dakota. If our producers and ranchers are to remain economically viable and a core part of their local communities, research and Extension must continue to focus on addressing their unique situations in a very timely manner. SDSU's efforts in drought management are just one example how we've accomplished this. Animal disease threatens animal-origin food production and the food animal sector of the agricultural economy. It also can impact human health and public confidence in the safety of food. The dairy industry in South Dakota is rapidly growing and consists of small producers as well as newer larger ones. These along with four growing processors within a 200-mile radius form the core of the dairy industry of the region.

2. Scope of the Program

- In-State Research
- In-State Extension
- Multistate Extension
- Integrated Research and Extension
- Multistate Research

V(D). Planned Program (Assumptions and Goals)**1. Assumptions made for the Program**

Funding will remain constant or increase. The challenges producers face are continually changing, and our research and Extension programs must be able to handle these rapid shifts. As long as we provide valuable information to our clientele, we will continue to have very strong support from our stakeholders. Animal diseases can be controlled and/or managed. The dairy industry of the region will continue to progress.

2. Ultimate goal(s) of this Program

To provide farmers and ranchers timely, unbiased information in a useful form to allow them to make sound business decisions from an economical, social, and environmental- friendly basis. Additional goals include animal health and well being, economical sustainability for the producers, and a safe and abundant animal-origin food supply for the consumers. And, to enhance partnerships and collaborations within the South Dakota and upper mid-west dairy industry for the sustainability of the dairy farms and industry.

V(E). Planned Program (Inputs)**1. Estimated Number of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2009	25.2	0.0	46.3	0.0
2010	24.6	0.0	45.8	0.0
2011	24.0	0.0	44.9	0.0
2012	24.0	0.0	45.0	0.0
2013	24.0	0.0	45.0	0.0

V(F). Planned Program (Activity)**1. Activity for the Program**

Animal scientists will continue to interact with stakeholders and Extension personnel to determine in which areas research efforts should be focused. In a systems approach, SDSU researchers will then develop research trials to address the wide array of challenges our producers face. Once the research is completed, the researchers will work with the Extension personnel in developing a variety of programs to get the information to producers. SDSU will work jointly with other agencies like South Dakota Department of Agriculture, Animal Industry Board, Department of Environment and Natural Resources, and federal agencies including Natural Resource Conservation Service and others in coordinated effort to get the message out in a variety of methods. Extension Veterinary Science activities include outreach to veterinary practitioners and food animal producers and other animal owners. This includes one to one meetings, animal health conferences, participation in professional continuing education efforts of the South Dakota Veterinary Medical Association and Extension newsletters and websites. Dairy Scientists will conduct research in dairy cattle nutrition to develop efficient methods for the utilization of by-products. Dairy Foods research will be conducted to develop newer healthier products via novel processes. Extension Dairy programs will conduct informational seminars and interactive learning opportunities on dairy profitability and nutrition for appropriate producer groups.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● One-on-One Intervention ● Workshop ● Other 1 (Dairy Advisory Teams) ● Demonstrations ● Other 2 (Focus Groups) 	<ul style="list-style-type: none"> ● Other 2 (radio, print media) ● TV Media Programs ● Newsletters ● Other 1 (E-newsletters) ● Web sites

3. Description of targeted audience

All ranchers, livestock producers, dairy producers and processors, and veterinarians in the state, as well as concerned citizens and policy makers. In addition, other state and federal agencies including the SD Department of Agriculture, Animal Industry Board, Department of Environment, and Natural Resources, Natural Resource Conservation Service.

V(G). Planned Program (Outputs)**1. Standard output measures**

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	2260	6010	330	290
2010	2400	6100	360	300
2011	3100	6720	400	310
2012	3100	6700	400	300
2013	3100	6700	400	300

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications**

2009 :0 2010 :1 2011 :2 2012 :1 2013 :1

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs

1. Output Target

● Number of research projects completed on enhancing sustainable production.				
2009 :10	2010 :10	2011 :15	2012 :15	2013 :0
● Number of research projects completed on dairy foods				
2009 :2	2010 :3	2011 :4	2012 :4	2013 :0
● Number of research projects completed on dairy production				
2009 :2	2010 :3	2011 :4	2012 :4	2013 :0

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of ranchers learning new production techniques
2	Number of farmers using new production techniques
3	Number of veterinarians and producers learning about animal disease.
4	Number of veterinarians and producers changing behaviors to improve the control of animal disease

Outcome #1**1. Outcome Target**

Number of ranchers learning new production techniques

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**1200**2010 :** 1200**2011 :** 1500**2012 :**1500**2013 :** 1400**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 305 - Animal Physiological Processes
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 313 - Internal Parasites in Animals

Outcome #2**1. Outcome Target**

Number of farmers using new production techniques

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**350**2010 :** 450**2011 :** 600**2012 :**600**2013 :** 600**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 305 - Animal Physiological Processes
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 313 - Internal Parasites in Animals

Outcome #3**1. Outcome Target**

Number of veterinarians and producers learning about animal disease.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**600**2010 :** 600**2011 :** 750**2012 :**750**2013 :** 700**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 305 - Animal Physiological Processes
- 311 - Animal Diseases
- 313 - Internal Parasites in Animals

Outcome #4**1. Outcome Target**

Number of veterinarians and producers changing behaviors to improve the control of animal disease

2. Outcome Type : Change in Action Outcome Measure**2009 :**200**2010 :** 200**2011 :** 250**2012 :**250**2013 :** 200**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 311 - Animal Diseases
- 313 - Internal Parasites in Animals

V(J). Planned Program (External Factors)**1. External Factors which may affect Outcomes**

- Other (animal disease outbreaks)
- Economy
- Competing Public priorities
- Natural Disasters (drought,weather extremes,etc.)
- Government Regulations
- Competing Programatic Challenges
- Appropriations changes
- Public Policy changes

Description

Further description:

- Farm economy (changes in feed cost and availability)
- Natural Disasters (drought, weather extremes, etc.)
- Competing public priorities
- International and/or livestock health factors (BSE, avian flu, antibiotic residue)
- o Foreign animal disease outbreaks (accidental)
- o Malicious introduction of new diseases (Ag bioterrorism)

- o New spontaneous diseases
- Reduction in funds available
- Change is research focus/expectation at the university
- Competing public priorities

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- Case Study
- Time series (multiple points before and after program)

Description

Extension Educators will keep a log of successfully implemented Animal Science programs. Surveys will be given at commodity group meetings on their needs and how well our efforts have been in addressing those needs.

- Evaluate new products from the ethanol and soybean industries as feeds for dairy cattle.
- Continue evaluation of methods to modify the composition of milk that may increase the healthfulness and marketability of milk.
- Conduct research intended to minimize environmental pollution by animal waste products.
- Evaluate new industrial byproducts and feed additives in nutritional management of dairy cattle.
- Continue evaluation of the use of glucose precursors and fermentation modifications for prevention of health disorders in transition dairy cows.
- Conduct research intended to improve cow comfort and herd health.
- Continue research on the development of membrane processes, microfiltration in particular, for dairy processing applications. A project is being developed to evaluate the application of microbial cultures for growth of other undesirable bacteria in fermented products.
- Continue research on exopolysaccharides from lactic acid bacteria.
- Identify and evaluate milk processing techniques that will inhibit or remove light-induced oxidized off-flavor in fluid milk.
- Develop recommendations for producing frozen desserts with improved texture and nutrition.

2. Data Collection Methods

- Unstructured
- Case Study
- Observation
- Journals
- On-Site
- Sampling
- Tests
- Structured

Description

Each project will identify appropriate data collection methods

V(A). Planned Program (Summary)**Program #4****1. Name of the Planned Program**

Agricultural, Natural Resource and Biological Engineering

2. Brief summary about Planned Program

AES research and CES educational programs in Agricultural, Natural Resource and Biological Engineering promotes economically viable technology for crop and livestock producers maintaining quality environment for all citizens. Program areas of emphasis are in: a) livestock indoor environment control, b) livestock facilities, c) airborne emissions from livestock operations, d) water management for cropping systems, e) climatic impacts on crop and livestock producers, f) nutrient management in watersheds. This planned program integrates with Plants and their Systems, particularly in the areas of cropping, systems information, and management programs. It also integrates with Animals and their Systems in comprehensive nutrient management and odor control.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
401	Structures, Facilities, and General Purpose Farm Supplies	34%		34%	
403	Waste Disposal, Recycling, and Reuse	33%		33%	
404	Instrumentation and Control Systems	33%		33%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

The South Dakota climate has substantial fluctuations in precipitation and temperature from one year to the next. Crop and livestock producers need effective strategies to deal with climate uncertainty. South Dakota has abundant land and feed resources that could be economically used by livestock producers if the public could be assured that additional livestock would not affect the environmental quality of the state.

2. Scope of the Program

- In-State Extension
- Multistate Extension
- In-State Research
- Integrated Research and Extension
- Multistate Research

V(D). Planned Program (Assumptions and Goals)**1. Assumptions made for the Program**

Funding will remain constant or increase. Environmental issues can be effectively addressed

2. Ultimate goal(s) of this Program

To increase farm production and income in South Dakota.

V(E). Planned Program (Inputs)**1. Estimated Number of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2009	5.0	0.0	3.9	0.0
2010	4.9	0.0	3.8	0.0
2011	4.8	0.0	3.7	0.0
2012	4.5	0.0	3.5	0.0
2013	4.0	0.0	3.0	0.0

V(F). Planned Program (Activity)**1. Activity for the Program**

Conduct research on livestock facilities, water management and climatic impacts on crop and livestock producers. Extension will conduct informational seminars and interactive learning opportunities for producer groups across South Dakota.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● Education Class ● Demonstrations 	<ul style="list-style-type: none"> ● Web sites ● Newsletters ● TV Media Programs ● Other 1 (Radio and print media)

3. Description of targeted audience

All farm/ranch producers in the state

V(G). Planned Program (Outputs)**1. Standard output measures**

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	200	2000	0	0
2010	200	2000	0	0
2011	200	2000	0	0
2012	200	2000	0	0
2013	200	2000	0	0

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications**

2009 :0 **2010 :0** **2011 :1** **2012 :1** **2013 :1**

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs**1. Output Target**

- Number of research projects completed on livestock facilities, water management or climatic impacts on crop and livestock producers

2009 :4 **2010 :4** **2011 :4** **2012 :4** **2013 :0**

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of farmers learning about improved livestock facilities, water management or climatic impact on crops and livestock.

Outcome #1

1. Outcome Target

Number of farmers learning about improved livestock facilities, water management or climatic impact on crops and livestock.

2. Outcome Type : Change in Knowledge Outcome Measure

2009 :125

2010 : 150

2011 : 175

2012 :190

2013 : 200

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Competing Public priorities
- Government Regulations
- Appropriations changes
- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Competing Programatic Challenges
- Public Policy changes

Description

Natural disasters, animal disease, and increasing fuel prices, represent the most likely external factors which may affect outcomes.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Time series (multiple points before and after program)

Description

Time series evaluations are planned, but additional studies may be conducted as deemed appropriate by the scientists and/or Extension professional.

2. Data Collection Methods

- Observation
- Sampling
- Unstructured
- Structured
- Case Study
- On-Site
- Tests

Description

Each project will identify appropriate data collection methods

V(A). Planned Program (Summary)**Program #5****1. Name of the Planned Program**

Food and Non-food Products, Development, Processing, Quality and Delivery

2. Brief summary about Planned Program

Agricultural Experiment Station (AES) research and Cooperative Extension Educational programs address the need for an integrated approach to meeting the development, processing, quality and delivery of food and non-food products in South Dakota and beyond our borders. The integrated research approach at South Dakota State University addresses quality, safety and final impact in the following areas: environment, economics/marketing, regulations, technology, and the end user. Addressing the needs of the industry by working with the producer, processor or end user requires networking within the university system and those outside the university that affect the overall process of a food or nonfood product. The research that is driven by this demand is often applied, looking at the potential use of the product and what impacts its development and delivery. The research is integrated with the delivery component through the SDSU Cooperative Extension Service (CES). CES will reach out to the producer, processor and end user to assist with meeting the individual needs for the direction this product can be most utilized to improve the quality of life of the people of South Dakota. Research and Extension programs will grow from new food and non-food processing plants that are being built in South Dakota. These include a turkey processing plant, and several biofuels plants.

3. Program existence : Mature (More than five years)**4. Program duration :** Long-Term (More than five years)**5. Expending formula funds or state-matching funds :** Yes**6. Expending other than formula funds or state-matching funds :** No**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	40%		40%	
502	New and Improved Food Products	33%		33%	
511	New and Improved Non-Food Products and Processes	27%		27%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

South Dakota is an agricultural state that is increasingly exploring opportunities to add value to the products raised in our state, particularly in the area of biofuels. Community and economic development will result from the processing of food and non-food products from locally grown agricultural plants and animals. As products are processed, there are many co-products produced which need to be optimized for economic benefit. There are also several cottage industries marketing directly from the producer to the end user. Our priority is to address the needs and providing research based information, regulatory information, and connecting them with the resources and people that will move them forward.

2. Scope of the Program

- In-State Extension
- Multistate Extension
- Multistate Research
- Integrated Research and Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)**1. Assumptions made for the Program**

Funding will remain constant and increase. Technology, research, and information can be made available at South Dakota State University through the Cooperative Extension Service. There will be a growing demand for biofuels technology, training and associated industries. As the U.S. economy moves toward a possible recession, the price of food will likely increase, with comparable changes in associated industries.

2. Ultimate goal(s) of this Program

Develop and deliver food and non-food products across South Dakota and beyond our boards that are safe and of good quality. Develop and delivery food and non-products that positively impact the economy and people of South Dakota.

V(E). Planned Program (Inputs)**1. Estimated Number of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2009	6.7	0.0	23.2	0.0
2010	6.6	0.0	22.9	0.0
2011	6.4	0.0	22.4	0.0
2012	7.0	0.0	23.0	0.0
2013	7.0	0.0	23.0	0.0

V(F). Planned Program (Activity)**1. Activity for the Program**

SDSU will develop a biofuels initiative that includes research, Extension and teaching programs.

Research processes using the latest technology to improve the utilization of by-products for food and non-food products.

Connect producers, processors, end users, regulatory officials, economic development professionals, marketing specialists, researchers and extension personnel to integrate the development and delivery of food and non-food products.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● Demonstrations ● Group Discussion 	<ul style="list-style-type: none"> ● TV Media Programs ● Web sites ● Newsletters ● Other 1 (Radio and print media)

3. Description of targeted audience

Biofuels producers

Producers – all types of agriculture.

Youth Organizations

Gardeners

Cottage Industry

Processors – use products produced in both South Dakota, and neighboring states.

End Users (includes retail and consumers)

V(G). Planned Program (Outputs)**1. Standard output measures****Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	75	275	50	50
2010	100	300	50	50
2011	100	300	50	50
2012	150	400	50	50
2013	125	375	50	50

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications****2009 :0****2010 :1****2011 :1****2012 :1****2013 :1****3. Expected Peer Review Publications**

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs**1. Output Target**

- Number of research projects completed on food/non-food products

2009 :2**2010 :2****2011 :2****2012 :2****2013 :0**

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of producers/processors/end users working with SDSU for research and/or Extension programs related to the development, processing, quality and/or delivery of food or non-food products.
2	Number of producers/processors/end users using the research and educational tools developed by SDSU and their collaborators to make decisions related to the development and delivery of the identified food or non-food item.
3	Number of producers/processors/end users that have developed and are delivering a product impacts the economic/quality of life for the people of South Dakota.

Outcome #1**1. Outcome Target**

Number of producers/processors/end users working with SDSU for research and/or Extension programs related to the development, processing, quality and/or delivery of food or non-food products.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**15**2010 :** 20**2011 :** 20**2012 :**20**2013 :** 20**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 511 - New and Improved Non-Food Products and Processes

Outcome #2**1. Outcome Target**

Number of producers/processors/end users using the research and educational tools developed by SDSU and their collaborators to make decisions related to the development and delivery of the identified food or non-food item.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**20**2010 :** 25**2011 :** 25**2012 :**25**2013 :** 25**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 511 - New and Improved Non-Food Products and Processes

Outcome #3**1. Outcome Target**

Number of producers/processors/end users that have developed and are delivering a product impacts the economic/quality of life for the people of South Dakota.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**1**2010 :** 1**2011 :** 1**2012 :**1**2013 :** 2**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 511 - New and Improved Non-Food Products and Processes

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Competing Public priorities
- Economy
- Government Regulations
- Other (fuel prices)
- Competing Programatic Challenges
- Appropriations changes
- Public Policy changes
- Populations changes (immigration,new cultural groupings,etc.)
- Natural Disasters (drought,weather extremes,etc.)

Description

Cost and availability of energy is an important factor which may affect outcomes. Additional factors include weather and climate, competitive developments of other products that may come on the market, available labor, and changes in the local business climate which impact new and developing processors.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- Case Study
- During (during program)

Description

The evaluation plan will primarily focus on garnering needs of target audiences and identifying impacts. The evaluation plan will also address the outcomes identified.

2. Data Collection Methods

- On-Site
- Observation
- Portfolio Reviews
- Sampling
- Mail
- Case Study
- Structured

Description

Each project will identify appropriate data collection methods.

V(A). Planned Program (Summary)

Program #6

1. Name of the Planned Program

Economics and Market Policy

2. Brief summary about Planned Program

Economics, business, and market policy research and Extension programs of the Department of Economics are driven by the requirement to allocate scarce resources to competing entities which seek to maximize profitability in an ever changing social, political, and economic environment. Business management is the principal area of emphasis with programs and projects aimed at providing information and answering questions in production economics, financial analysis, marketing management, human resources, and agricultural policy analysis. Because of increasing competition from producers around the globe, attention to domestic policy analysis, world trade organization, and economic development are essential program areas for enhanced effort. American and World Farm Policy makers have increased the focus on “green” agriculture. Projects to evaluate the impacts of changes in environmental policy on profitability and rural communities are needed to develop information for enhanced management decision making. Recent announcements by President Bush concerning U.S. energy self sufficiency and renewable fuel production from biomass necessitate stronger collaboration among professionals from multiple academic disciplines and industry. The economist’s role is to determine economic/financial feasibility of new energy processes and to estimate environmental and economic impacts of the industry. Unintended external consequences from changes will be identified and economists must stand ready to value these impacts—negative and positive.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	37%		37%	
602	Business Management, Finance, and Taxation	9%		9%	
604	Marketing and Distribution Practices	9%		9%	
606	International Trade and Development	9%		9%	
607	Consumer Economics	9%		9%	
608	Community Resource Planning and Development	9%		9%	
610	Domestic Policy Analysis	18%		18%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Farms and other agri-businesses continue to expand. With expansion comes the need for large amounts of investment and operating capital. Opportunity for profit and loss are both high. Managers need risk management tools to help combat the uncertainties of world economic policies, weather's impact on supply, and constantly changing wants and needs of the world's consumers.

2. Scope of the Program

- In-State Research
- Multistate Extension
- Integrated Research and Extension
- In-State Extension
- Multistate Research

V(D). Planned Program (Assumptions and Goals)**1. Assumptions made for the Program**

Internal resources will be constant.

External resources will be sought for program enhancements.

Collaboration with professionals from other disciplines will be strongly encouraged.

Managers will continue to request information and decision tools.

2. Ultimate goal(s) of this Program

Improved profitability, reduced risk, and enhanced rural well being.

V(E). Planned Program (Inputs)**1. Estimated Number of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2009	10.1	0.0	17.4	0.0
2010	9.8	0.0	17.2	0.0
2011	9.6	0.0	16.8	0.0
2012	9.6	0.0	16.0	0.0
2013	9.0	0.0	16.0	0.0

V(F). Planned Program (Activity)**1. Activity for the Program**

Research will be conducted in priority areas of resource allocation and economic development, policy analysis, financial analysis, renewable and value-added agriculture, and marketing alternatives. Extension will provide training in formal and informal venues. Research findings will be extended to the appropriate audiences.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● One-on-One Intervention 	<ul style="list-style-type: none"> ● Other 1 (Radio and print media) ● Newsletters ● Web sites ● TV Media Programs

3. Description of targeted audience

Agri-business persons in South Dakota and the Northern Plains Region. Managers, extension educators and professional colleagues will all benefit from the program activities.

V(G). Planned Program (Outputs)**1. Standard output measures**

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	1500	10000	100	500
2010	1500	10000	100	500
2011	1500	10000	100	500
2012	1500	10000	100	500
2013	1500	10000	100	500

2. (Standard Research Target) Number of Patent Applications Submitted

Expected Patent Applications

2009 :0 2010 :0 2011 :0 2012 :0 2013 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs

1. Output Target

- Extension Educations Trained

2009 :50 2010 :50 2011 :50 2012 :50 2013 :0

- One-on-One Management Consultations

2009 :50 2010 :50 2011 :50 2012 :50 2013 :0

- Completed Research Projects

2009 :5 2010 :5 2011 :5 2012 :5 2013 :0

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of farmers calculating production costs and returns to storage.
2	Number of agri-business persons aware of marketing strategies and crop insurance and farm program alternatives.
3	Number of agri-business persons aware of their financial positions and farm business plan components.
4	Number of farmers employing marketing strategies and allocating scarce resources effectively.
5	Number of agri-businesses with improved profitability.

Outcome #1**1. Outcome Target**

Number of farmers calculating production costs and returns to storage.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**300**2010 :** 300**2011 :** 300**2012 :**300**2013 :** 300**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 604 - Marketing and Distribution Practices
- 607 - Consumer Economics

Outcome #2**1. Outcome Target**

Number of agri-business persons aware of marketing strategies and crop insurance and farm program alternatives.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**300**2010 :** 300**2011 :** 300**2012 :**300**2013 :** 300**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 604 - Marketing and Distribution Practices

Outcome #3**1. Outcome Target**

Number of agri-business persons aware of their financial positions and farm business plan components.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**75**2010 :** 100**2011 :** 100**2012 :**100**2013 :** 100**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 607 - Consumer Economics

Outcome #4**1. Outcome Target**

Number of farmers employing marketing strategies and allocating scarce resources effectively.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**70**2010 :** 100**2011 :** 130**2012 :**150**2013 :** 175**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 604 - Marketing and Distribution Practices

Outcome #5**1. Outcome Target**

Number of agri-businesses with improved profitability.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**35**2010 :** 55**2011 :** 75**2012 :**75**2013 :** 75**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 606 - International Trade and Development
- 607 - Consumer Economics
- 608 - Community Resource Planning and Development
- 610 - Domestic Policy Analysis

V(J). Planned Program (External Factors)**1. External Factors which may affect Outcomes**

- Economy
- Natural Disasters (drought,weather extremes,etc.)
- Public Policy changes
- Government Regulations

Description

In addition, the following factors may affect outcomes:
 Domestic and world trade and agricultural policies
 Economic conditions in importing countries
 Production disasters—drought, disease, flood
 Budget decisions from Federal to local level

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- After Only (post program)
- Case Study

Description

Survey of participants to determine use of information and impact on success
Monitoring usage levels of all awareness activities

2. Data Collection Methods

- Structured
- Unstructured
- Mail
- Telephone
- On-Site
- Sampling
- Observation
- Portfolio Reviews
- Case Study

Description

Each project will determine appropriate data collection methods.

V(A). Planned Program (Summary)**Program #7****1. Name of the Planned Program**

Human Nutrition, Food Safety, and Human Health and Well-Being

2. Brief summary about Planned Program

Planned research will focus on obesity prevention and understanding the benefits of South Dakota produced, health-promoting foods, including lean meat and soy. Dr. Sergeev's research on health-promoting activity of soy phytochemicals will elucidate the role of soy components in regulation of cell death in human mammary epithelial cells. The goal of this project is to understand the potential anticancer activity of soy. Dr. Wang's research will continue to investigate the role of soy foods in prevention of cancer and heart diseases by focusing on the functions of soy isoflavones and other phytochemicals such as phytate and saponins. Dr. Kattelman's research will focus on the relationship of young adult's fruit and vegetable consumption and obesity. Specifically her research will investigate the most effective methods of behavior change regarding fruit and vegetable consumption. Dr. Droke's research will explore obesity in terms of what is currently being done by practitioners with a concurrent exploration into more useable physical screening tools. These activities are followed by ethnographic studies of families with children between the ages of 4 - 10 years old to distinguish parental behaviors that override the obesogenic environment. Upon completion of activities and of results, a framework for implementing realistic intervention strategies will emerge.

A significant focus for family and youth Extension programs is the delivery of human nutrition education. Increasing time pressures, dual worker families and societal changes have led to a shift in American dining habits. With this shift in diet have come a range of nutrition related issues, including an epidemic of obesity. As families rely increasingly on foods prepared outside the home, traditional skills in food preparation and food safety have diminished. Rising health care costs due in part to food borne illness and obesity related health care are borne by society in the form of increased health and insurance costs and an increased tax burden to support government sponsored care of lower-income groups and seniors. SDSU Cooperative Extension works to address these issues by providing research based education at the individual, family and community level, striving to improve personal nutrition and lifestyle choices with a range of consumers from young children to seniors. Extension is actively providing nutrition education, food safety, food preservation and preparation and physical activity education programs.

Through the administration of two federal programs, the Family Nutrition Program (FNP) and the Expanded Food and Nutrition Education Program (EFNEP), educators and nutrition assistants are assisting low income South Dakota citizens in acquiring the knowledge, skills, attitudes and changed behavior necessary for nutritionally sound diets by contributing to their personal development and the improvement of the total family diet and nutritional well-being. This outreach results in the improvement of dietary nutritional quality, reduction of the incidence of chronic disease, increased safe food handling practices, and increased food security through responsible fiscal management of limited food dollars.

SDSU Cooperative Extension is also active in providing food handling and food safety training for South Dakota's food industry, including retail food service establishments, temporary food stands, community events and school systems located primarily in rural, isolated areas of the state.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
702	Requirements and Function of Nutrients and Other Food Component	33%		33%	
703	Nutrition Education and Behavior	34%		34%	
722	Zoonotic Diseases and Parasites Affecting Humans	33%		33%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Obesity is a growing national concern. Like national trends, obesity has increased in South Dakota from 12.8% of the general population in 1991 to 20.6% in 2001. Populations of particular concern include children/youth where approximately 16% of South Dakota youth are at risk for becoming chronically overweight and another 17% are already overweight. Other health risks include heart disease and cancer. These two diseases continue to be leading causes of death for both men and women in the U.S. For both, healthy diets and lifestyles continue to be the best prevention known. Understanding how soy consumption contributes to the prevention of both will provide future direction for targeted intervention.

The impact of nutrition and health wellness will continue to have an economic impact on South Dakota in the next five years. The health-related cost of obesity to society has been documented in numerous media reports. The prevalence of obesity has risen from 12.8% in 1991 to 20.6% in 2001. In certain situations, obesity and poverty may be interrelated. The poverty rate in South Dakota ranges by county from 6%-36% with an average of 12%. Food borne illness exact an unknown cost due to illness and reduction in work productivity. Thus, nutrition education, food safety, food security and wellness programs will be the priority for this next programming period.

2. Scope of the Program

- Integrated Research and Extension
- Multistate Extension
- In-State Research
- Multistate Research
- Multistate Integrated Research and Extension
- In-State Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We assume that obesity will continue to be one of the leading health concerns in the next five years for all populations and especially youth. We also predict that cancer and heart diseases will continue to be two of the leading causes of death into the foreseeable future. We assume, when it comes to health, that prevention is far more cost effective than intervention.

We assume that funding will remain constant or increase. Availability of federal grants to address obesity programming and integrated food safety efforts will continue to be prevalent.

2. Ultimate goal(s) of this Program

- To decrease the incidence of obesity this will lead to a healthier population with fewer health-related problems.
- To reduce the number of deaths due to heart diseases and cancer in South Dakota.
- To improve nutritional knowledge, increase physical activity, and change food safety practices to improve physical well being

and the personal health of individuals across the lifespan and economic quadrant.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2009	18.5	0.0	3.9	0.0
2010	18.0	0.0	3.8	0.0
2011	17.6	0.0	3.7	0.0
2012	17.0	0.0	3.5	0.0
2013	17.0	0.0	3.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Meat science research will be conducted on short preparation times, products with healthy nutritional profiles, soy phytochemicals from the state point of how consumption of soy contributions to reduced health risks. Research will also be conducted on aspects of obesity prevention including changing eating behavior (targeting fruits and vegetables). Research will be both laboratory (bench science) and social science in nature.

Extension will conduct informational seminars, interactive learning opportunities, group classes and provide printed curriculum to youth audiences (4-H, schools, after school programs, head start and child care centers) and adult audiences (worksites, pre-formed groups, teachers, parents, senior citizens) as well as community based groups (licensed food service establishments, temporary food stands, mobile food units and community based organizations/agencies/churches). Educational programs will include farm food safety on salmonella in varied beef production systems.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Workshop • Other 1 (Scholarly publications) • Education Class 	<ul style="list-style-type: none"> • Newsletters • Other 1 (Radio and print media) • Web sites • TV Media Programs

3. Description of targeted audience

- All consumers in the state or region. For some studies, a more targeted audience such as young adults.
- Small children and youth
- Adults and senior citizens
- Low income citizens
- Targeted business owners
- School personnel
- Extension field educators
- Health care professionals
- Educators and other professionals who work in nutrition education, foodservice, etc.
- Tribal colleges in S.D. and youth who attend reservation schools

V(G). Planned Program (Outputs)**1. Standard output measures****Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	4050	8000	4050	9000
2010	4050	8000	4550	9000
2011	4050	8000	5050	9000
2012	4050	8000	5050	9000
2013	4000	8000	5000	7000

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications**

2009 :0 2010 :1 2011 :0 2012 :1 2013 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs**1. Output Target**

- Number of research projects

2009 :2 2010 :3 2011 :4 2012 :4 2013 :0

V(I). State Defined Outcome

O. No	Outcome Name
1	Increase in soy foods production and consumption by South Dakota citizens, by percentage of the population.
2	Increase in fruit and vegetable consumption, by percentage of the population.
3	Decrease in obesity rates by percentage of the population.
4	Number of participants demonstrating ability to choose or prepare food with reduced fat and/or calories.
5	Number of participants increasing the number of minutes spent daily in physical activity.
6	Number of businesses engaged in a worksite wellness program.
7	Number of food service managers implementing a safe food handling training program for employees, thus increasing the retention rate of training participants in the food service industry (workforce).
8	Increased number of food safety programs for volunteers cooking for large groups and temporary food stands.

Outcome #1**1. Outcome Target**

Increase in soy foods production and consumption by South Dakota citizens, by percentage of the population.

2. Outcome Type : Change in Action Outcome Measure**2009 :**2**2010 :** 3**2011 :** 4**2012 :**4**2013 :** 4**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior

Outcome #2**1. Outcome Target**

Increase in fruit and vegetable consumption, by percentage of the population.

2. Outcome Type : Change in Action Outcome Measure**2009 :**2**2010 :** 3**2011 :** 4**2012 :**4**2013 :** 4**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior

Outcome #3**1. Outcome Target**

Decrease in obesity rates by percentage of the population.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**0**2010 :** 2**2011 :** 1**2012 :**1**2013 :** 1**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior

Outcome #4**1. Outcome Target**

Number of participants demonstrating ability to choose or prepare food with reduced fat and/or calories.

2. Outcome Type : Change in Action Outcome Measure**2009 :**1200**2010 :** 1500**2011 :** 2000**2012 :**2000**2013 :** 2000**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior

Outcome #5**1. Outcome Target**

Number of participants increasing the number of minutes spent daily in physical activity.

2. Outcome Type : Change in Action Outcome Measure**2009 :**1200**2010 :** 1500**2011 :** 2000**2012 :**2000**2013 :** 2000**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

Outcome #6**1. Outcome Target**

Number of businesses engaged in a worksite wellness program.

2. Outcome Type : Change in Action Outcome Measure**2009 :**150**2010 :** 300**2011 :** 500**2012 :**500**2013 :** 500**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

Outcome #7**1. Outcome Target**

Number of food service managers implementing a safe food handling training program for employees, thus increasing the retention rate of training participants in the food service industry (workforce).

2. Outcome Type : Change in Action Outcome Measure**2009 :**125**2010 :** 150**2011 :** 200**2012 :**200**2013 :** 225**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

Outcome #8

1. Outcome Target

Increased number of food safety programs for volunteers cooking for large groups and temporary food stands.

2. Outcome Type : Change in Action Outcome Measure

2009 :100

2010 : 150

2011 : 200

2012 :200

2013 : 150

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 722 - Zoonotic Diseases and Parasites Affecting Humans

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Appropriations changes
- Competing Public priorities
- Government Regulations
- Economy
- Public Policy changes

Description

Additional factors also include:

- New health-related findings about soy or obesity
- Cure for cancer of heart diseases which circumvents diet
- Drugs which can prevent or cure obesity (regardless of diet)
- Competing public priorities

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Time series (multiple points before and after program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals,group,organizations) and non-participants
- After Only (post program)

Description

- Control/treatment studies to show impact of behavior change intervention
- Qualitative studies to learn about obesity
- Trials with mice (research design)
- Pre/post tests
- Dietary recall

2. Data Collection Methods

- Observation
- Case Study
- On-Site
- Sampling
- Structured

Description

Each project will determine appropriate data collection methods.

V(A). Planned Program (Summary)**Program #8****1. Name of the Planned Program**

Families, Youth and Communities

2. Brief summary about Planned Program

This Planned Program represents the largest percent of time dedicated to educational efforts by the Cooperative Extension Service. Planned research will focus on rural families and quality of life issues. The combined AES and CES efforts will strengthen families and communities. Bronfenbrenner's ecological model will be used to investigate families from micro, exo and mesosystems. Specific studies will focus on low-income families' quality of life as impacted by policy change, couple marital stability, and family financial well-being. Dr. Hess' research on rural, low-income family well-being in an era of welfare reform will continue to look at family adaptive behavior in the context of welfare reform. She will assess, over time, how South Dakota families have adapted to policy (particularly as it relates to welfare) and economic changes to achieve self sufficiency. Dr. Cumber will identify characteristics associated with healthy, viable rural communities and how quality of life is enhanced by vibrant communities. The long term outcome will be to study stability and out migration of rural communities. Dr. Gardner will continue to investigate the long term impact of marital education in terms of impact on the incidence of divorce and domestic violence. Drs. Enevoldsen and Gorham will study families in terms of savings behavior. They will identify characteristics of families who do or do not save and develop an educational model to move families along a continuum from "no savings" to "fully engaged in saving and investing wealth". Overarching these studies will be the continuation of the Rural Life Census Data Center which tracks demographic changes in communities using population studies, demographic trends and economic indicators. The Center provides current and historical census data for educators, community leaders, researchers and other officials at the community, county and state levels.

As the nature of American society moves toward a knowledge and skills based economy, the importance of human capital and its development/enhancement is being recognized. Social challenges, threats to the family and urban/rural poverty continue to challenge or reduce the capacity of many Americans to reach their full potential. Family Consumer Science and Youth Development/4-H educational outreach programs provide a foundation in which South Dakota families can gain critical help in strengthening their family structure. This includes addressing specific family challenges – saving for retirement, parenting, child care and empowering the aged.

Increased training in science & technology, work force preparation, and strengthening opportunities for young people to be civically engaged in their community are critical youth development/4-H priorities in the next five years. This is closely linked to the emerging need to provide educational programs in Community Development. Rural communities throughout South Dakota are seeking assistance in leadership development, poverty reduction, civic engagement and improved economic capacity.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management	33%		33%	
802	Human Development and Family Well-Being	17%		17%	
803	Sociological and Technological Change Affecting Individuals, Familie	33%		33%	
805	Community Institutions, Health, and Social Services	17%		17%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Rural life is challenging. In South Dakota, most rural communities find themselves struggling to hang on. Population loss, economic limitations, aging populations, and out-migration of young people highlight the most significant challenges. Because South Dakota is essentially 100% rural with just two larger population centers on the eastern and western borders, sustaining rural life is critical. The priority for rural quality of life studies will investigate these challenges from multiple perspectives. Understanding demographic changes, low-income families ability to adapt, family relationships, and financial well-being are at the center of future research. The priority will be to translate research findings into information and programming which will be useful to rural families and communities.

Family and Consumer Science Extension programs will focus on retirement planning, parenting education, child care education and successful aging. Youth Development/4-H programs will focus on science, engineering & technology, citizenship and work force preparation. Community development programs will focus on poverty reduction, leadership development, civic engagement & expanded economic capacity building.

2. Scope of the Program

- In-State Research
- Multistate Extension
- Integrated Research and Extension
- In-State Extension
- Multistate Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We assume that rural communities will continue to be challenged with loss in population and economic struggles. We also assume that current demographic trends will continue into the next five years which include lower income, aging population, and loss of youth to more urban areas. We also assume that strong community leadership is important to the success of rural communities such as economic development, access to family and social services, and education to build strong relationships and financial wellbeing. We also assume that funding will remain constant or increase. Availability of grants to address community development or youth programs in science & technology will potentially be available to provide additional funding.

2. Ultimate goal(s) of this Program

- To sustain a rural quality of life for families.
- To build strong families who experience healthy marriages and are financially secure by strengthening relationships and

increasing capacity for financial planning and saving

- To assist rural communities so as to remain viable.
- To increase the human and social capital in South Dakota communities by improving leadership development, addressing poverty and seeking solutions for improved economic capacities. Strong family units build strong communities.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2009	57.1	0.0	9.7	0.0
2010	55.8	0.0	9.6	0.0
2011	54.4	0.0	9.4	0.0
2012	54.0	0.0	9.0	0.0
2013	54.0	0.0	9.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research will be conducted on rural low income families, rural communities, premarital education with longitudinal follow ups, and financial saving behavior. Research will be social science in nature. Census data will also be available to communities.

Extension will conduct informational seminars, interactive learning opportunities, group classes, and provide printed curriculum to youth audiences (4-H, schools, afterschool programs, head start and child care centers) and adult audiences (senior citizens, community organizations, parents, teachers, others) while also working with community based groups (city councils, community development groups, city councils).

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop 	<ul style="list-style-type: none"> ● Newsletters ● Web sites ● TV Media Programs

3. Description of targeted audience

- Rural communities in South Dakota.
- Extension educators
- Community planners and developers
- Educators and other professionals who work in social services including welfare programs targeting low-income audiences.
- Tribal colleges in S.D. and families who reside on the reservations
- Youth
- Adults
- Senior citizens
- Targeted business owners
- Low income citizens

V(G). Planned Program (Outputs)**1. Standard output measures****Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2009	5000	8000	4000	7000
2010	5000	8000	4500	7000
2011	5000	8000	5000	7000
2012	5000	8000	5000	7000
2013	5000	8000	5000	7000

2. (Standard Research Target) Number of Patent Applications Submitted**Expected Patent Applications****2009 :0****2010 :0****2011 :0****2012 :0****2013 :0****3. Expected Peer Review Publications**

Year	Research Target	Extension Target	Total
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0

V(H). State Defined Outputs**1. Output Target**

- Number of research projects completed

2009 :2**2010 :3****2011 :4****2012 :4****2013 :0**

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of participants who have reduced their debt
2	Number of participants who have increased their personal savings
3	Number of child care professionals who provide more stimulating environments and/or activities for the children they care for.
4	Number of participants reporting improved parent-child communication
5	Number of families who report making changes in family elder care as a result of participating in an Extension program.
6	Number of youth participating in math, engineering or science related activities to further develop workforce preparation skills.
7	Number of youth that were engaged as partners in community civic activities with an adult.
8	Number of communities that were engaged in poverty reduction and/or leadership development activities that lead to the development of a strategic plan for action.
9	Decrease in divorce or domestic violence among South Dakota couples who received premarital education, by percentage of the population.
10	Increase in low-income family self-sufficiency, by percentage of the population.
11	Number of communities reporting an increase in rural community vitality (population stability, economic indicators)

Outcome #1**1. Outcome Target**

Number of participants who have reduced their debt

2. Outcome Type : Change in Action Outcome Measure**2009 :**1000**2010 :** 1200**2011 :** 1500**2012 :**1500**2013 :** 500**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management

Outcome #2**1. Outcome Target**

Number of participants who have increased their personal savings

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**1000**2010 :** 1200**2011 :** 1500**2012 :**1500**2013 :** 1000**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management

Outcome #3**1. Outcome Target**

Number of child care professionals who provide more stimulating environments and/or activities for the children they care for.

2. Outcome Type : Change in Action Outcome Measure**2009 :**1000**2010 :** 1200**2011 :** 1500**2012 :**1500**2013 :** 1500**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 805 - Community Institutions, Health, and Social Services

Outcome #4**1. Outcome Target**

Number of participants reporting improved parent-child communication

2. Outcome Type : Change in Action Outcome Measure**2009 :**600**2010 :** 800**2011 :** 1000**2012 :**1000**2013 :** 1000**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being

Outcome #5**1. Outcome Target**

Number of families who report making changes in family elder care as a result of participating in an Extension program.

2. Outcome Type : Change in Knowledge Outcome Measure

2009 :250 **2010 :** 500 **2011 :** 750 **2012 :**750 **2013 :** 750

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families and Communities
- 805 - Community Institutions, Health, and Social Services

Outcome #6**1. Outcome Target**

Number of youth participating in math, engineering or science related activities to further develop workforce preparation skills.

2. Outcome Type : Change in Knowledge Outcome Measure

2009 :500 **2010 :** 800 **2011 :** 1000 **2012 :**1000 **2013 :** 1000

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 805 - Community Institutions, Health, and Social Services

Outcome #7**1. Outcome Target**

Number of youth that were engaged as partners in community civic activities with an adult.

2. Outcome Type : Change in Action Outcome Measure

2009 :250 **2010 :** 400 **2011 :** 750 **2012 :**750 **2013 :** 750

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being

- 803 - Sociological and Technological Change Affecting Individuals, Families and Communities
- 805 - Community Institutions, Health, and Social Services

Outcome #8**1. Outcome Target**

Number of communities that were engaged in poverty reduction and/or leadership development activities that lead to the development of a strategic plan for action.

2. Outcome Type : Change in Knowledge Outcome Measure**2009 :**30**2010 :** 30**2011 :** 30**2012 :**30**2013 :** 50**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 803 - Sociological and Technological Change Affecting Individuals, Families and Communities
- 805 - Community Institutions, Health, and Social Services

Outcome #9**1. Outcome Target**

Decrease in divorce or domestic violence among South Dakota couples who received premarital education, by percentage of the population.

2. Outcome Type : Change in Action Outcome Measure**2009 :**2**2010 :** 3**2011 :** 4**2012 :**4**2013 :** 4**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being

Outcome #10**1. Outcome Target**

Increase in low-income family self-sufficiency, by percentage of the population.

2. Outcome Type : Change in Action Outcome Measure**2009 :**0**2010 :** 2**2011 :** 1**2012 :**1**2013 :** 1**3. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families and Communities

- 805 - Community Institutions, Health, and Social Services

Outcome #11

1. Outcome Target

Number of communities reporting an increase in rural community vitality (population stability, economic indicators)

2. Outcome Type : Change in Action Outcome Measure

2009 :2

2010 : 3

2011 : 3

2012 :3

2013 : 5

3. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

4. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 805 - Community Institutions, Health, and Social Services

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Public Policy changes
- Appropriations changes
- Competing Public priorities
- Government Regulations

Description

Specific factors include rate of inflation and resulting impact on overall economy, and community specific disasters such as tornados or ice storms.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Case Study
- Before-After (before and after program)
- After Only (post program)
- Retrospective (post program)

Description

Evaluations may include studies that document behavior change, and qualitative studies to learn about communities.

2. Data Collection Methods

- Observation
- Whole population
- Mail
- Telephone
- Structured
- On-Site
- Case Study
- Sampling
- Unstructured

Description

Each project will determine appropriate data collection methods.